



2017-18

### 3.5 Transformations

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

1. Suppose that the graph of a function  $f$  is known. Then the graph of  $y = f(x - 2)$  may be obtained by a(n) \_\_\_\_\_ shift of the graph  $f$  to the \_\_\_\_\_ a distance of 2 units.
2. Suppose that the graph of a function  $f$  is known. Then the graph of  $y = f(-x)$  may be obtained by a reflection about the \_\_\_\_\_ - axis of the graph of the function  $y = f(x)$ .
3. Suppose that the graph of a function  $g$  is known. The graph of  $y = g(x) + 2$  may be obtained by a \_\_\_\_\_ shift of the graph of  $g$  \_\_\_\_\_ a distance of 2 units.
4. **True or False** The graph of  $y = -f(x)$  is the reflection about the x-axis of the graph of  $y = f(x)$ .
5. **True or False** To obtain the graph of  $f(x) = \sqrt{x+2}$ , shift the graph of  $y = \sqrt{x}$  horizontally to the right 2 units.
6. **True or False** To obtain the graph of  $f(x) = x^3 + 5$ , shift the graph of  $y = x^3$  vertically up 5 units.

**Describe how the graph of the given function can be transformed into the equations for a-c.**

7.  $f(x) = x^2$

8.  $f(x) = |x|$

a)  $y = -x^2$

a)  $y = -3|x| + 4$

b)  $y = \frac{1}{2}x^2$

b)  $y = |x - 7| + 2$

c)  $y = x^2 + 5$

c)  $y = \frac{1}{4}|x + 1|$

9.  $f(x) = \sqrt{x}$

a)  $y = \sqrt{x+5} - 1$

b)  $y = \sqrt{2x} + 7$

c)  $y = \frac{1}{3}\sqrt{x-1}$

10.  $f(x) = \frac{1}{x}$

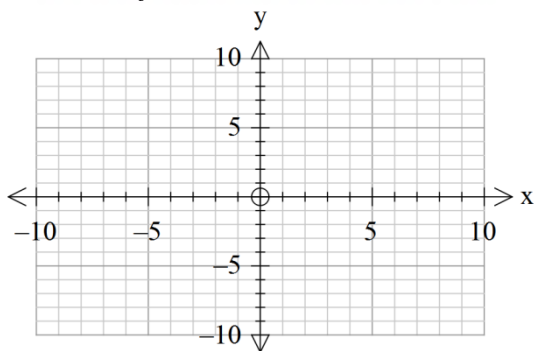
a)  $y = \frac{1}{x-4} + 2$

b)  $y = -3\left(\frac{1}{x}\right) - 8$

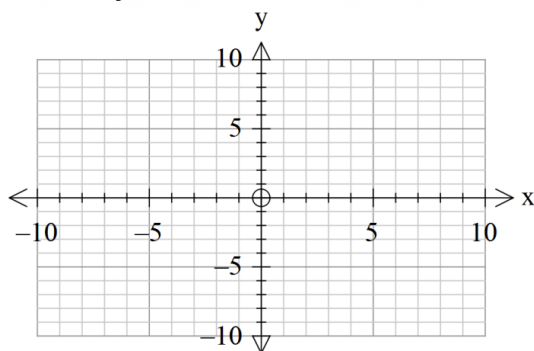
c)  $y = \frac{1}{-x-7}$

**Sketch the graphs of each function by hand. Use a table with the key points for the parent function then perform the transformations that will give the new points in a new table. State the transformations.**

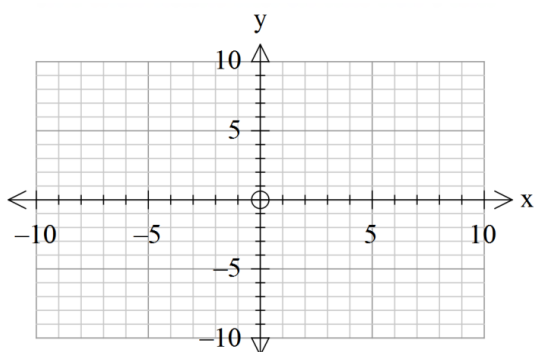
11.  $f(x) = \sqrt[3]{x+2}$



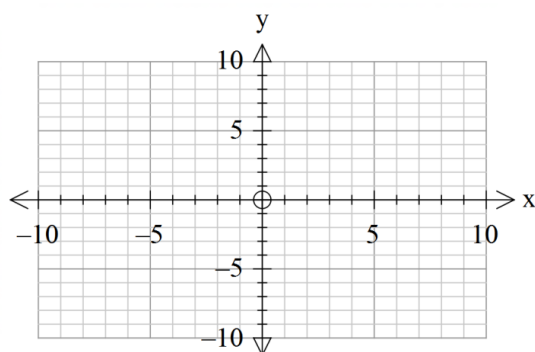
12.  $f(x) = 2\sqrt[3]{x} - 3$



13.  $f(x) = -\sqrt[3]{x-2}$



14.  $f(x) = -2|x-1| + 2$



**Find the equation of the reflection of  $f$  across the a)  $x$ -axis and b) the  $y$ -axis.**

15.  $f(x) = x^3 - 2x^2 - 3x + 5$

16.  $f(x) = 3\sqrt{x+2} - 5$

17.  $f(x) = \sqrt[3]{27x}$

18.  $f(x) = -2|x-4|$

**Describe a basic parent function and a sequence of transformations that can be used to produce a graph of the given function.**

19.  $f(x) = -(x-4)^3 - 2$

20.  $f(x) = 3\sqrt{-x} + 5$

21.  $f(x) = -2(x-1)^2 + 5$

22.  $f(x) = (5x)^2 - 3$

**Write the equation for the new function that is obtained from the given transformations on the parent function.**

23.  $f(x) = \sqrt[3]{x}$  : a vertical stretch by a factor of 2, horizontal shift left 3.

24.  $f(x) = |x|$  : a shift left 2 units, then a vertical stretch by a factor of 3, then a shift up 4 units.

**Divide using long division.**

**Solve.**

25.  $\frac{x^2 - 2x - 30}{x + 5}$

26.  $5x - 8 = -x - 4$